

Amendments to the Claims

Please cancel Claims 1-36 and 40-49. Please amend Claim 50. Please add new Claims 51-57. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. – 36. (Canceled)

37. - 39. (Canceled)

40. – 49. (Canceled)

50. (Currently Amended) A reactor for generating a hydrogen-rich reformat from hydrocarbons, comprising:

a core reaction zone having an outer wall, the core reaction zone configured to conduct at least one exothermic reaction and at least one fuel reforming reaction;

at least four shells arranged concentrically about the outer wall of the core reaction zone, a gap being defined between the outer wall of the core reaction zone and each of the successive shells to form a plurality of coaxial zones, the shells being configured to permit heat transfer directly between each adjacent zone, including the core reaction zone;

at least four fluid flows, each in a different coaxial zone, wherein at least two of the fluid flows comprise a reactant that is ~~pre-heated~~ heated from ~~an initial~~ a first temperature to a second higher temperature ~~suitable for a reaction~~ by traversing a coaxial zone, and wherein at least one of the fluid flows comprises a hot product of a reaction that is cooled from an initial elevated temperature to a second cooler temperature by traversing a coaxial zone.

51. (New) The reactor of Claim 50 wherein one of the at least one exothermic reaction comprises a burner and wherein exhaust from the burner is flowed through one of the at least four shells for heat exchange with one or more other zones.

52. (New) The reactor of Claim 50 wherein at least one of the at least four fluid flows is countercurrent to fluid flows in other concentric shells.
53. (New) The reactor of Claim 50 wherein the gaps of the plurality of coaxial zones are configured such that the fluid flow in each zone is predominantly turbulent.
54. (New) The reactor of Claim 50 wherein the gaps of the plurality of coaxial zones are maintained by spacers placed between successive shells.
55. (New) The reactor of Claim 54 wherein spacers are selected from the group including: dimples; rods; flat screens; or undulating screens.
56. (New) The reactor of Claim 50 wherein the at least one fuel reforming reaction includes a steam reforming reaction.
57. (New) The reactor of Claim 50 wherein the second higher temperature is a temperature suitable for a reaction of the reactant.